

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Applicant(s)
BEN K. KACYRA et al.

Filing Date
October 23, 1998

Group
2877

U.S. PATENT DOCUMENTS

*Examiner Initials	Document Number	Date	Name	Class	Subclass	Filing Date
SN	AA 4,658,218	04/14/87	Kennedy-Wallace et al. <i>SK</i>	330	4.3	12/10/84
SN	AB 5,531,520	07/02/96	Grimson et al. <i>GA</i>	382	131	09/01/94
SN	AC 4,907,586	03/13/90	Bille et al. <i>LA</i>	606	5	03/31/98

FOREIGN PATENT DOCUMENTS

*Examiner Initials	Document Number	Date	Country	Class	Subclass	Translation YES NO
SN	AD GB 2 292 605 A	02/28/96	United Kingdom <i>ST</i>	G01B	11/24	x
SN	AE 06188501	07/08/94	Japan (abstract)	H01S	3/11	x
SN	AF 57004564	01/11/82	Japan (abstract) ✓	G01S	7/48	x
SN	AG 62108172	05/19/87	Japan (abstract)	G01S	7/48	x
SN	AH DE 41 09 844 C1	03/26/91	Germany ✓	G01S	17/10	x

OTHER DOCUMENTS

SN	AI	Colin Bradley et al., "Free-form Surface Reconstruction for Machine Vision Rapid Prototyping", Optical Engineering, September 1993, Vol. 32, No. 9, pp. 2191-2200. <i>ST</i>
	AJ	Chia-Wei Liao et al., "Surface Approximation of a Cloud of 3D Points", Graphical Models and Image Processing, January 1995, Vol. 57, No. 1, pp. 67-74. ✓
	AK	A.B. Dobrzeniecki et al., "Interactive and Intuitive Segmentation of Volumetric Data: The Segmentview System and the Kooshball Algorithm", Institute of Electrical and Electronics Engineers, Proceedings of the International Conference on Image Processing (ICIP), October 23, 1995, Vol. 3, pp. 540-543. <i>ST</i>
	AL	Jong Hoon Park et al., "Three-Dimensional Object Representation and Recognition Based on Surface Normal Images", Pattern Recognition, June 1993, Vol. 26, No. 6, pp. 913-921. <i>ST</i>
SN	AM	Paul F. Hemler et al., "Active Model Matching in Range Images", IEEE International Conference on Robotics and Automation, March 31, 1987, Vol. 1, pp. 228-233. <i>OL</i>

Examiner

Senguyen

Date Considered

06/05/99

* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

FORM PTO-1449 (Modified) (Rev. 7-80)		U.S. Dept. of Commerce Patent and Trademark Office		Atty Docket No. KYRA-410 US4		Appln. No.	
INFORMATION DISCLOSURE CITATION				Applicant BEN K. KACYRA et al.			
(Use several sheets if necessary)				Filing Date October 23, 1998		Group 2877	

U.S. PATENT DOCUMENTS							
*Examiner Initials	Document Number	Date	Name	Class	Subclass	Filing Date	
AN			/				
AO							

FOREIGN PATENT DOCUMENTS							
*Examiner Initials	Document Number	Date	Country	Class	Subclass	Translation YES NO	
AP			/				

OTHER DOCUMENTS		
SN	AQ	Narayan Sriranga Raja et al., "Obtaining Generic Parts from Range Images Using a Multi-view Representation", Image Understanding, July 1994, Vol. 60, No. 1, pp. 44-64. <input checked="" type="checkbox"/>
	AR	Shinichi Tamura et al., "Error Correction in Laser Scanner Three-Dimensional Measurement by Two-Axis Model and Coarse-Fine Parameter Search", Pattern Recognition, March 1994, Vol. 27, No. 3, pp. 331-338. <input checked="" type="checkbox"/>
	AS	Takeo Kanade et al., "A Very Fast VLSI Rangefinder", Proceedings of the 1991 IEEE International Conference on Robotics and Automation, Sacramento, California, April 1991, pp. 1322-1329. <input checked="" type="checkbox"/>
	AT	James D. Spinhirne, "Micro Pulse Lidar", IEEE Transactions on Geoscience and Remote Sensing, January 1993, Vol. 31, No. 1, pp. 48-55. <input checked="" type="checkbox"/>
	AU	Sateesha G. Nadabar et al., "Fusion of Range and Intensity Images on a Connection Machine (CM-2)", Pattern Recognition, January 1995, Vol. 28, No. 1, pp. 11-26. <input checked="" type="checkbox"/>
SN	AV	Kazuo Nakazawa et al., "Development of 3-D Robot Vision Sensor with Fiber Grating", IECON '91, 1991 International Conference on Industrial Electronics, Control and Instrumentation, October 28, 1991, Vol. 3, pp. 2368-2372. <input checked="" type="checkbox"/>

Examiner <div style="font-family: cursive; font-size: 1.2em; margin-top: 10px;">Sargam</div>	Date Considered <div style="font-family: cursive; font-size: 1.2em; margin-top: 10px;">06/05/98</div>
---	--

* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



- 5 -

PATENT

Sheet 1 of 5

FORM PTO-1449 (Modified) (Rev. 7-80)	U.S. Dept. of Commerce Patent and Trademark Office	Atty Docket No. KYRA-410 US4	Appln. No. 09/177,935
INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)		Applicant(s) Ben K. Kacyra et al.	
		Filing Date October 23, 1998	Group 2786

RECEIVED

FEB - 9 1999

Group 2700

U.S. PATENT DOCUMENTS

*Examiner Initials		Document Number	Date	Name	Class	Subclass	Filing Date
	*AK	4,860,304	08/22/89	Mooradian	372	92	02/02/88
	*AB	4,928,152	05/22/90	Gerardin	356	5	02/24/87
	*AC	5,006,721	04/09/91	Cameron et al.	250	561	03/23/90
	*AD	5,110,203	05/05/92	MacCabee	356	5	08/28/91
	*AF	5,132,977	07/21/92	Zayhowski et al.	372	10	11/29/90
	*AF	5,337,149	08/09/94	Kozah et al.	356	376	11/12/92
	*AG	5,381,431	01/10/95	Zayhowski	372	25	08/13/93
	*AH	5,386,427	01/31/95	Zayhowski	372	34	02/10/94
	*AI	5,394,413	02/28/95	Zayhowski	372	10	03/04/94
	*AJ	5,606,409	02/25/97	Schneiter	356	4.02	12/27/94
	*AK	5,623,335	04/22/97	Bamberger	356	5.01	05/04/95
	*AL	5,638,163	06/10/97	Nourrcier, Jr.	356	5.01	06/07/95
	*AM	5,638,164	06/10/97	Landau	356	5.01	08/09/95
	*AN	5,719,664	02/17/98	Besesty et al.	356	5.01	10/03/95
	*AO						

FOREIGN PATENT DOCUMENTS

*Examiner Initials		Document Number	Date	Country	Class	Subclass	Translation YES NO	
	*AP	2 662 244	11/22/91	France	G01B	11/26		X
	AQ							

OTHER DOCUMENTS

	*AR	E.S. Cameron & R. Doshi, "The Design and Manufacture of a High-Resolution Laser Radar Scanner," <u>SPIE Laser Radar IV</u> , Vol. 1103, 1989, pp. 190-197.
	*AS	T.C. Strand, "Optical three-dimensional sensing for machine vision," <u>Optical Engineering</u> , Vol. 24, No. 1, January/February 1995, pp. 33-40.
	*AT	S-Y. Lu & R.K. Johnson, "A New True 3-D Motion Camera System from Lawrence Livermore," <u>Advanced Imaging</u> , July 1995, pp. 51 & 54.
	*AU	

Examiner

Date Considered

* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



- 6 -

PATENT

Sheet 2 of 5

FORM PTO-1449 (Modified) (Rev. 7-80)		U.S. Dept. of Commerce Patent and Trademark Office		Atty Docket No. KYRA-410 US4		Appln. No. 09/177,935	
INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)				Applicants Ben K. Kacyra et al.		FEB - 9 1999	
				Filing Date October 23, 1998		Group 2786	
U.S. PATENT DOCUMENTS							
*Examiner Initials		Document Number	Date	Name	Class	Subclass	Filing Date
	*BA	5,114,226	05/19/92	Goodwin et al.	356	5	09/28/90
	BB						
FOREIGN PATENT DOCUMENTS							
*Examiner Initials		Document Number	Date	Country	Class	Subclass	Translation YES NO
	BC						
OTHER DOCUMENTS							
	*BD	N. Woodbury, M. Brubacher & J.R. Woodbury, "Noninvasive Tank Gauging With Frequency-Modulated Laser Ranging," <u>Sensors</u> , September 1993, pp. 27-31					
	*BE	R.R. Clark, "A Laser Distance Measurement Sensor for Industry and Robotics," <u>Sensors</u> , June 1994, pp. 43-45 & 47.					
	*BF	Brochure by Azimuth "Laser Ranging Systems," including Product Description "LRY-750E," 3/96, 10 pages in length.					
	*BG	Brochure by Automated Precision, Inc., "Precision Measurement and Sensing Instruments for Manufacturing," 1996, pp. front cover, 1-15 & back cover.					
	*BH	D.S. Schwartz, "Vision Metrology System: An Automated Noncontact Three-Dimensional Measurement System," <u>General Dynamics Corporation</u> , Copyright 1989, 7 pages in length					
	*BI	Brochure by John E. Chance & Associates, Inc., "TruckMap," May 1994, 2 pages in length.					
	*BJ	D. Knopp, "Megamodels from MicroStation - Photography goes 3D," <u>MicroStation Manager</u> , August 1994, pp. 60-63.					
	*BK	M. Laasonen, "Surveying and Data Processing in Building Renovation," <u>Surveying Science in Finland</u> , Vol. 11, No. 1-2, 1993, p. 3-14, reformatted pp. 1-7.					
	*BL	A.J. Mäkynen, J.T. Kostamovaara & R. Myllylä, "Tracking Laser Radar for 3-D Shape Measurements of Large Industrial Objects Based on Time-of-Flight Laser Rangefinding and Position-Sensitive Detection Techniques," <u>IEEE Transactions on Instrumentation and Measurement</u> , Vol. 43, No. 1, February 1994, pp. 40-49.					
	*BM	T.T. Wohlers, "3D Digitizers," <u>Computer Graphics World</u> , July 1992, pp. 73-77.					
	*BN	T. Wohlers, "The Challenge of 3D Digitizing," <u>Computer Graphics World</u> , November 1995, pp. 21-22.					
Examiner				Date Considered			
* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							

RECEIVED

FEB - 9 1999

Group 2700



-7-

PATENT

Sheet 3 of 5

FORM PTO-1449 (Modified)
(Rev. 7-80)

U.S. Dept. of Commerce
Patent and Trademark Office

Atty Docket No.
KYRA-410 US4

Appln. No.
09/177,989

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Applicants
Ben K. Kacyra et al.

Filing Date
October 23, 1998

Group
2786

RECEIVED
FEB - 9 1999
Group 2700

U. S. PATENT DOCUMENTS

*Examiner Initials		Document Number	Date	Name	Class	Subclass	Filing Date
	CA						
	CB						

FOREIGN PATENT DOCUMENTS

*Examiner Initials		Document Number	Date	Country	Class	Subclass	Translation YES NO
	CC						

OTHER DOCUMENTS

	*CD	T. Wohlers, "3D Digitizing Systems, <u>Computer Graphics World</u> , April 1994, pp. 59-61.					
	*CE	K. Määttä, J. Kostamovaara & R. Myllylä, "Profiling of hot surfaces by pulsed time-of-flight laser range finder techniques," <u>Applied Optics</u> , Vol. 32, No. 27, 20 September 1993, pp. 5334-5347.					
	*CF	R.E. Garrett, "Advanced Technology for Blasters," <u>Rock Products</u> , January 1996, pp. 37-42.					
	*CG	Brochure by IBEO Systems, Inc., "Information on the LADAR Scanning System," IBEO Systems, October 13, 1994, 20 pages in length.					
	*CH	"Application Notes," Issue 2, IBEO Systems, Inc., September 1993, 6 pages in length.					
	*CI	Article by W. Niemeier & P. Wild, "Use of Laser Scanners for the Determination of Building Geometries," December 1995, pp. 275-284c.					
	*CJ	I. Kaisto, J. Kostamovaara, M. Manninen & R. Myllylä, "Laser radar based measuring systems for large scale assembly application," <u>SPIE</u> , Vol. 2088, 1994, pp. 121-131.					
	*CK	R.J. Pinheiro, C.D. Crane & J.S. Tulenko, "Laser Range Image Interpretation for Automated Mapping of Hazardous Environments," 1995.					
	*CL	H. Aillsto, J. Kostamovaara, I. Moring & R. Myllylä, "Applications of Laser Radar," <u>Sensor Review</u> , Vol. 13, No. 1, 1993, pp. 26-28.					
	*CM	Brochure by CATCO, "Laser Mapping System," January 1996, 27 pages in length.					
	*CN	M.H. Tulloch, "Laser Rangefinder/Speed Guns Find New Uses," <u>Photonics Spectra</u> , July 1992, one page in length.					
	*CO	Brochure by Laser Atlanta, "Prosurvey 1000 and Geolink Mapping Systems," July 1992, 10 pages in length.					

Examiner

Date Considered

* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



- 8 -

PATENT

Sheet 4 of 5

FORM PTO-1449 (Modified) (Rev. 7-80)	U.S. Dept. of Commerce Patent and Trademark Office	Atty Docket No. KYRA-410 US4	Appln. No. 09/177,935
INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)		Applicants Ben K. Kacyra et al.	
		Filing Date October 23, 1998	Group 2786

RECEIVED

FEB - 9 1999

Group 2700

U.S. PATENT DOCUMENTS

*Examiner Initials		Document Number	Date	Name	Class	Subclass	Filing Date
	DA						
	DB						

FOREIGN PATENT DOCUMENTS

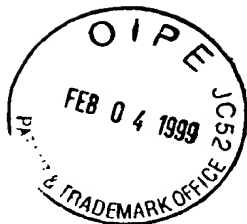
*Examiner Initials		Document Number	Date	Country	Class	Subclass	Translation YES NO
	DC						
	DD						

OTHER DOCUMENTS

*DE	B. Simon & T.T. Wohlers, "Capturing Surface Data," <u>DesignNet</u> , March 1992, one page in length.
*DF	Brochure by Perceptron, "Simultaneous 2-D and 3-D images from a single general-purpose camera," May 1995, 5 pages in length.
*DG	S. Ball, "Autoscanning Laser Systems a Valuable Tool," September 1996, 2 pages in length.
*DH	C. Bradley & G.W. Vickers, "Free-form surface reconstruction for machine vision rapid prototyping," <u>Optical Engineering</u> , Vol. 32, No. 9, September 1993, pp. 2191-2200.
*DI	P. Vähä, K. Käsälä, I. Kaisto & R. Heikkilä, "Application of 3-D CAD and 3-D Coordinate Meter in Frame Erection", <u>Automation and Robotics in Construction X, Elsevier Science Publishers B.V.</u> , 1993, pp. 487-494.
*DJ	"Take a Photo, Create a Model", <u>Computer Graphics World</u> , May 1994, pp. 58-59.
*DK	I. Kaisto, J. Kostamovaara, "Laser Rangefinding Techniques in the Sensing of 3-D Objects", <u>SPIE</u> , Vol. 1260, Sensing and Reconstruction of Three-Dimensional Objects and Scenes, 1990, pp. 122-133.
*DL	B. Turko, "A Picosecond Resolution Time Digitizer for Laser Ranging", <u>IEEE Transactions on Nuclear Science</u> , Vol. NS-25, No. 1, February 1978, pp. 75-80.
*DM	K.W. Wong, A.G. Wiley, & M. Lew, "GPS-Guided Vision Systems for Real-Time Surveying", <u>Journal of Surveying Engineering</u> , Vol. 115 No. 2, May 1989, pp. 243-251.
*DN	Brochure, Photo Modeler, EOS System, 1995, 2 pages in length.
*DO	Brochure, Kreon, 1995, 7 pages in length.
*DP	Brochure, Spatial Positioning Systems, Inc. (SPI), 1996, 4 pages in length.
*DQ	Brochure, Bechtel Corp., 1993, 4 pages in length.

Examiner	Date Considered
----------	-----------------

* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



- 9 -

PATENT

Sheet 5 of 5

FORM PTO-1449 (Modified) (Rev. 7-80)		U.S. Dept. of Commerce Patent and Trademark Office		Atty Docket No. KYRA-410 US4		Appln. No. 09/177,935	
INFORMATION DISCLOSURE CITATION (Use several sheets if necessary)				Applicants Ben K. Kacyra et al.		FEB - 9 1999 Group 2700	
				Filing Date October 23, 1998			
U.S. PATENT DOCUMENTS							
*Examiner Initials		Document Number	Date	Name	Class	Subclass	Filing Date
	EA						
	EB						
FOREIGN PATENT DOCUMENTS							
*Examiner Initials		Document Number	Date	Country	Class	Subclass	Translation YES NO
	EC						
	ED						
OTHER DOCUMENTS							
	*EE	Brochure, Micro Scan 3D, CyberOptics Corp., 1995, 1 page in length.					
	*EF	Advertisement, "MDL's Quarryman ALS", ACSM Bulletin, July/August 1996, pp. 36.					
	*EG	Brochure, "On-line 3-D Measuring Sysms," Mapvision II, date unknown, 4 pages in length.					
	*EH	Brochure, "TV Auto-Scanning Laser System (TV-ALS)," MDL Technologies, Inc., date unknown, 4 pages in length.					
	*EI	Brochure, "Surveyor ALS (Auto Scanning Laser System)," MDL Technologies, Inc., date unknown, 3 pages in length.					
	*EJ	M. Scherer, "Uni-Scan: A System for Automatic Architectural Surveying," date unknown, pp. 285-284c.					
	*EK	Brochure, "Cyberware Color 3D Digitizer," date unknown, 7 pages in length.					
	*EL	Brochure, "3D Laser Digitizing Systems," Laser Design, Inc., date unknown, 5 pages in length.					
	*EM	Brochure, "Access problems? Prism Problems? Gota do it fast?", Cubic Precision, date unknown, 5 pages in length.					
	EN						
Examiner				Date Considered			
* Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.							